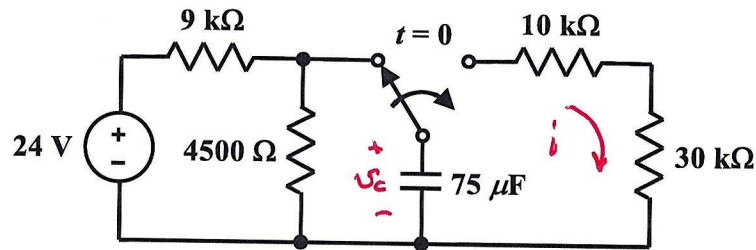


EE 2240
Homework Problem #066



The circuit has reached the DC steady state prior to $t = 0$. Determine the power absorbed by the $10\text{ k}\Omega$ resistor for $t \geq 0$.

$$v_c(0^-) = \frac{4500}{13500} \cdot 24\text{ V} = 8\text{ V}$$

$$v_c(0^+) = v_c(0^-) = 8\text{ V} = v_c(\infty)$$

For $t \geq 0$:

$$\tau = (10\text{ k}\Omega + 30\text{ k}\Omega)(75\text{ }\mu\text{F}) = 3\text{ s}$$

$$v_c(t) = 8 e^{-t/3}\text{ V}, t \geq 0$$

$$i(t) = \frac{v_c(t)}{40\text{ k}\Omega} = 0.2 e^{-t/3}\text{ mA}$$

$$\begin{aligned} P_{10\text{ k}\Omega}(t) &= (10\text{ k}\Omega) i^2(t) \\ &= (10\text{ k}\Omega) [0.2 e^{-t/3}\text{ mA}]^2 \\ &= 400 e^{-2t/3}\text{ }\mu\text{W} \end{aligned}$$